6090

SONY®

TRINITRON
COLOR
TV

Sweep-Alignment Procedures

for Models

KV-7010U, KV-7010UA, KV-9000U, KV-1200U
KV-1201, KV-1212, KV-1210U, KV-1212
KV-1224, KV-1510, KV-1710, KV-1720

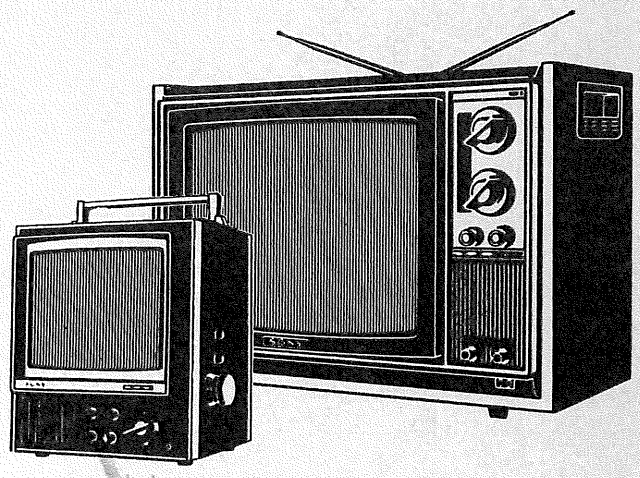

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TABLE OF CONTENTS

INTRODUCTION I

Connections for overall sweep alignment
from tuner through all the IFs II

1. Video I-F Alignment. 1-1

2. AFT Alignment 2-1

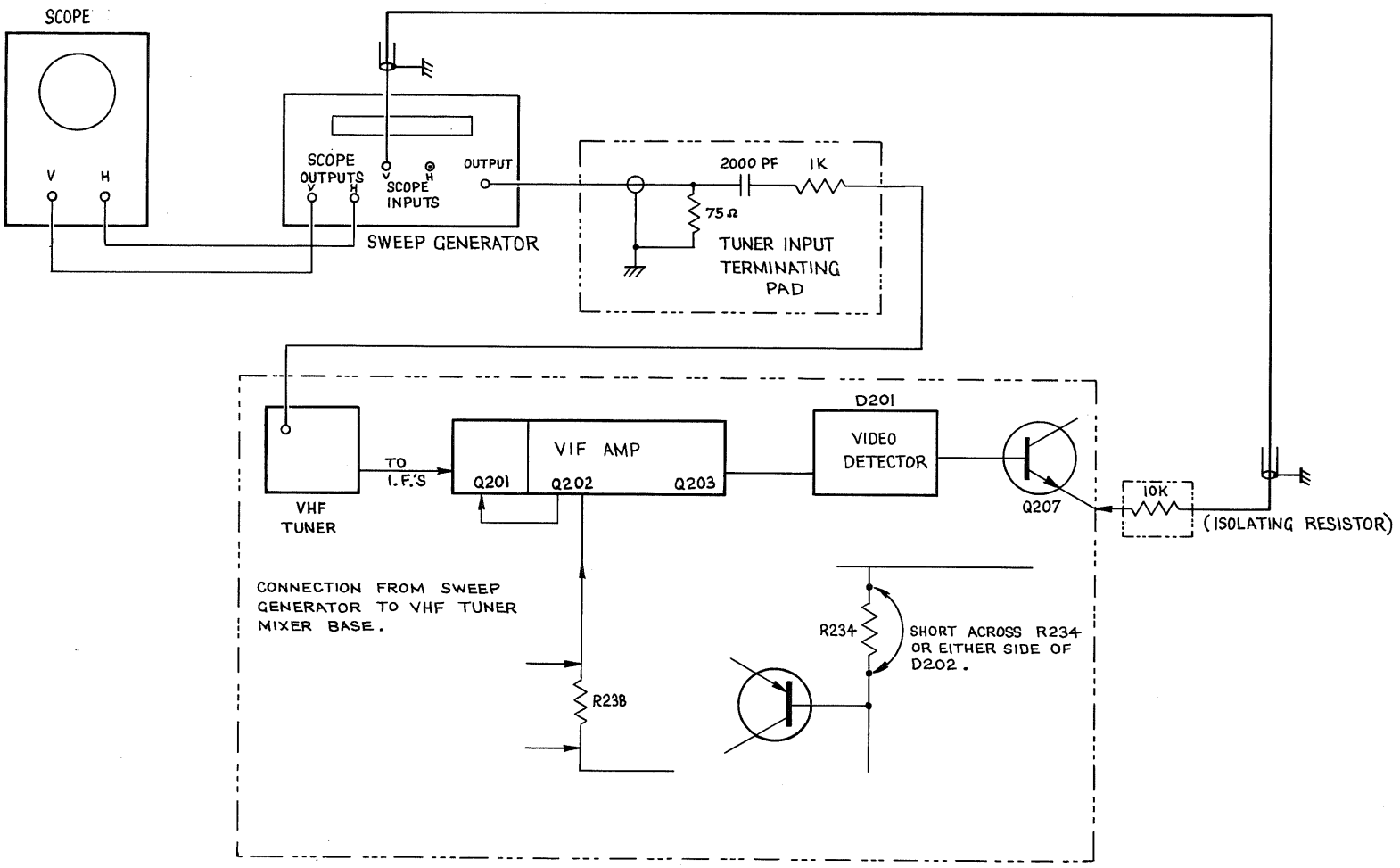
3. Overall I-F/Chroma-Bandpass Alignment 3-1

INTRODUCTION

This book shows how to sweep-align the video i-f stages, AFT systems and chroma bandpass amplifiers of the SONY Trinitron receivers noted on the cover.

The procedures given herein are generally the same for all Trinitron receivers so that one procedure is given for each job. However, specific differences as they apply to hookup arrangements and component-symbol nomenclature for the various models are given in the tables and hookup drawings.

Before an alignment job is attempted on any receiver, a thorough determination should be made to ensure that alignment is the cause of the problem. Alignment rarely "drifts" off in normal use, and serious degradation in performance is to be expected if alignment is attempted to make up for a faulty component. Alignment should be checked if the VHF tuner has been replaced, since the tuned circuit in the collector of the mixer plays a major role in determining the receiver's i-f response. Replacement of the first i-f transistor may also require an alignment check, but the second and third i-f transistors have little effect on overall alignment. Alignment must be checked if coils, transformers or traps in the i-f/chroma circuits have been replaced. However, alignment in this case should be limited to the component that has been replaced.



CONNECTIONS FOR OVERALL SWEEP ALIGNMENT FROM TUNER THROUGH ALL THE STAGES

1. OVERALL VIF ALIGNMENT PROCEDURE

1. EQUIPMENT REQUIRED:

   1. Video Sweep/Marker Generator Leader model LSW-330 or B & K model 415
      If above are not available, use a Sweep Generator and a Marker Generator
      (crystal calibrated), each covering from 39 - 48 MHz

   2. Oscilloscope

   3. Vacuum tube voltmeter (used only in final check, after alignment)

   4. 250 kΩ rheostat

   5. Three pads:

Pad I	30 dB attenuator
Pad II	Matching network
Pad III	Noise filter

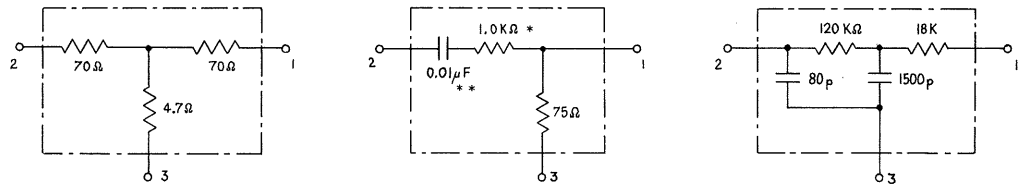


FIG. 1-1.

(When constructing these pads keep lead lengths as short as possible)

   6. 75Ω terminating plug

If sweep generator output is less than 100 mV RMS across 75 ohms, make Pad I 20 dB instead of 30 dB by changing components as shown below.

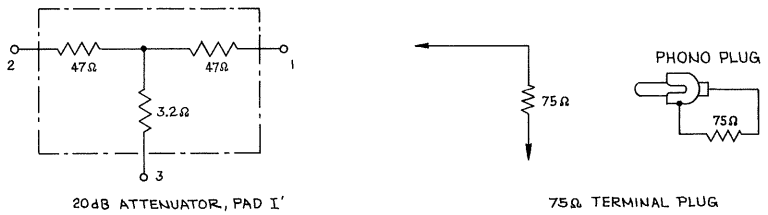


FIG. 1-2.

2. PRELIMINARY SETUP

1. Remove rf input connector (antenna) from VHF tuner and put a 75 Ω terminating plug in place of it.

2. Turn channel selector of tuner to the highest unused local station.

3. Set up as shown generally in Figure 1-3, and in the appropriate following pictorial diagrams (Figures 1-4 through 1-10) for various receivers showing S board, SC board or SD board connections.

4. Let the equipment warm up for at least 10 minutes.

5. Set the generator for 44 MHz, maximum output amplitude.

6. Set the oscilloscope horizontal sweep for 2-5 ms per division.

7. Calibrate the scope to display 1.5 V p-p over a large portion of the vertical scale.

8. Rotate the tuner AGC control VR-1, for minimum gain, and the IF AGC control VR-2, for maximum gain, as indicated in the first two items of Table 1-1. Turn the alignment setup rheostat (250kΩ) for maximum gain, by observing the effect on the scope display.

9. Adjust the generator output amplitude so that the scope displays a video bandpass curve of 1.0V. DO NOT CHANGE THE GENERATOR OUTPUT AFTER THIS STEP.

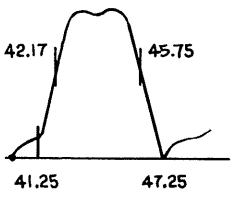
10. Remove Pad I, the 30 dB (or Pad I, 20 dB) attenuator and reconnect Pad II matching network directly to the tuner TP.

11. Adjust the 250kΩ rheostat to reduce the display on the scope back down to 1.0V.

Proceed with the alignment steps listed as follows.

3. VIDEO IF ALIGNMENT PROCEDURE

Throughout this procedure, readjust the 250kΩ rheostat after each step to keep the scope display amplitude at 1.0V (p-p).

Step	Item	Marker Freq. (MHz)	Adjust	Remarks
1.	2nd Video IF amp	44	VIFT-2	Adj. for max. on scope.
2.	3rd Video IF amp	44	VIFT-3	Adj. for max. on scope.
3.	Peak part of IF response	45.75 and 42.17	L1, tuner IF coil VC-1, bandwidth trimmer (on some sets available only from inside of board.) VIFT-1	Adj. to place the two markers at equal height on their sides of the curve (as near to 50% as possible). Curve should be symmetrical - sides as steep as possible.
4a	Marker traps (in this step temporarily readjust scope gain and position for greatest ease of observation of markers - do not readjust 250k-Ω rheostat)	47.25	VIFT-T-1 & VR-3	Adj. for placement of marker, for correct placement on curve, and for least change in symmetrical shape of curve inside of knees.
4b		41.25	VIFT-T-2 & VR-4	"
4c		39.75	VIFT-T-3	"
4d		41.25	VIFT-T-4	"
4e	Repeat steps 4a through 4d			
4f	Return scope controls to correct position and amplitude as before Step 4. Readjust 250k-Ω rheostat, if required, to set display amplitude at 1.0 V.			
5.	Final touch up			Check to see that the top of the curve moves up and down (tilts right and left) when VIFT-2 and VIFT-3 are rotated. If not, perform steps 1 through 3, above.
6.	Final check			Increase generator output level to MAX. and attenuate it to approx 70 dB while keeping the display on the oscilloscope 1.0V (p-p) by adjusting the 250k-Ω rheostat. Check to see that the response curve is varied within minimum tilt and symmetrical response as shown in Fig. on the left.

4. VIDEO DETECTOR OUTPUT ADJUSTMENT

a. Remove the 250kΩ rheostat and 75 ohm resistor from the tuner input. Connect the antenna plug to the tuner.

b. Hook up oscilloscope probe at emitter of 1st video amp Q1 in Fig. 1-3.

c. Tune in an average off-the-air signal (approx 10 mV RMS (=8 dBμ)/75Ω).

d. Adjust IF AGC control VR2 for 1.0 V (p-p) on the scope display (as shown in Table 1).

5. TUNER AGC CONTROL ADJUSTMENT

a. Tune in the strongest off-the-air signal in the area.

b. Adjust tuner AGC control VR-1 for minimum snowy noise and cross modulation.

c. Check each channel.

6. 4.5 MHz TRAP ADJUSTMENT

a. Tune in an off-the-air signal.

b. Turn the Fine Tuning knob clockwise to obtain a herring bone beat on the screen.

c. Adjust the 4.5 MHz TRAP, to obtain minimum herringbone beat on the screen.

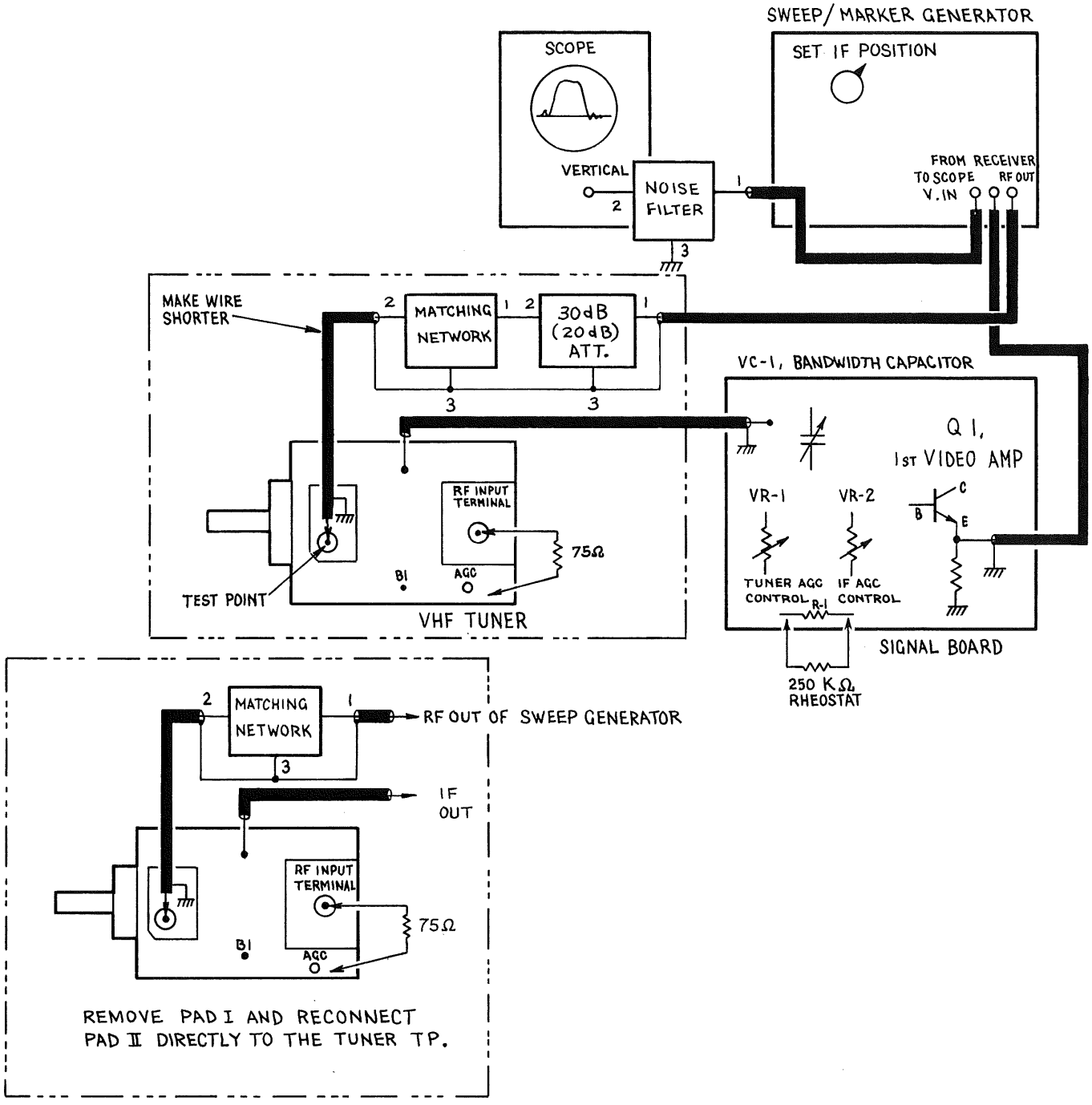


FIG. 1-3.

VIDEO IF ALIGNMENT SETUP, GENERAL

TABLE 1-1

	KV-7010U	KV-7010UA	KV-9000U	KV-1210U*	KV-1200U, -1220U, -1210U**, -1224	KV-1201, -1212, -1510, -1710, -1720
Tuner AGC control, VR-1	VR204	VR202	VR201	VR202	VR202	VR201
(Rotate for min. gain from view of the foil side) *	CCW	CW	-	CW	CCW	CCW
IF AGC control VR-2	VR203	VR203	VR203	VR204	VR204	VR203
(Rotate for max. gain from view of the foil side) *	CW	CW	-	CW	CCW	CCW
Bias Resistor, fixing IF Gain, R-1	R224 (or TP202)	R224	R229	R239	R239	R238
1st Video Amp Q1	X204	Q204	Q204	Q210	Q210	Q207
Video Detector Output level (V p-p)	1.0	0.8 (or 1.0)	1.0	1.0	1.0	1.0
2nd IF Transformer, VIFT-2	VIFT-2	VIFT-2	VIFT-2, T205	VIFT-2	VIFT-2, T203	VIFT-2, T203
3rd IF Transformer, VIFT-3	VIFT-3	VIFT-3	VIFT-3, T206	VIFT-3	VIFT-3, T204	VIFT-3, T204
1st IF Transformer, VIFT-1	VIFT-1	VIFT-1	VIFT-1, T201	VIFT-1	VIFT-1, T201	VIFT-1, T201
Bandwidth trimmer, VC-1	VC201	VC201	VC201	VC201	VC201	VC201
Tuner IF coil, L-1	Tuner IF	Tuner IF	Tuner IF	Tuner IF	Tuner IF	Tuner IF
47.25 MHz trap transformer VIFT-T-1	TRP201	TRP201	VIFT-T1, T202	VIFT-T1	L201	VIFT-T1, L201
47.25 MHz trap attenuation adjusting resistor, VR-3	VR201	VR201	-	VR201	VR201	-
41.25 MHz trap transformer (1)	TRP203	TRP203	VIFT-T2, T203	VIFT-T2	T202	VIFT-T2, T202
41.25 MHz trap transformer (2) VIFT-T-4	VIFT-T4	TRP204	VIFT-T4, T207	VIFT-T4	T205	VIFT-T4, T205
41.25 MHz trap attenuation adjusting resistor, VR-4	VR202	VR204	VR202	VR203	VR203	VR202
39.75 MHz trap transformer VIFT-T-3	TRP202	TRP202	VIFT-T3, T204	VIFT-T3	L202	VIFT-T3, L202
4.5 MHz trap, T-1	4.5 MHz trap	TRP205	T212	T207	T207	T207

*Up to Ser. No. 100,001

**After Ser. No. 100,001

SD BOARD

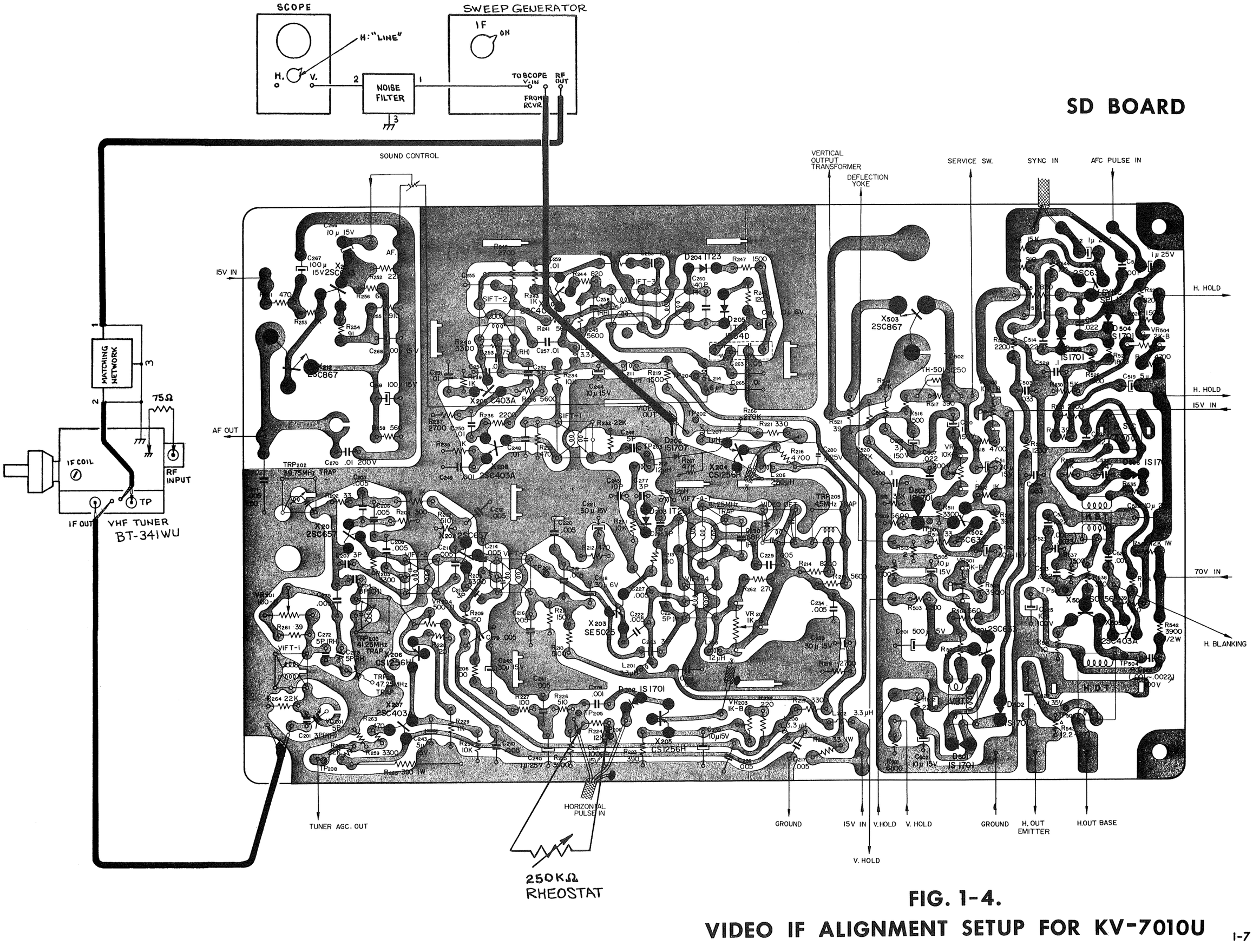


FIG. 1-4.
VIDEO IF ALIGNMENT SETUP FOR KV-7010U

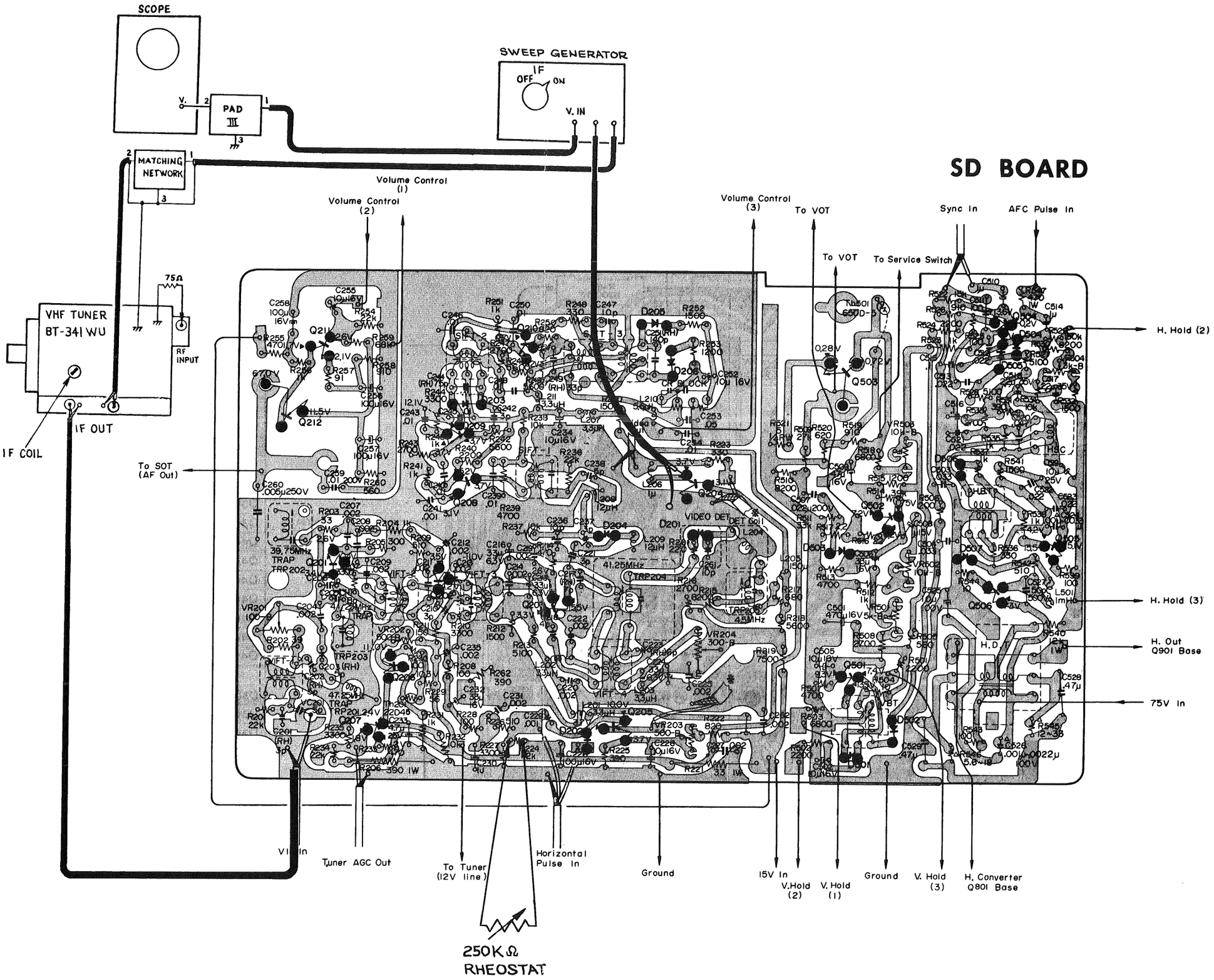


FIG. 1-5.

VIDEO ALIGNMENT SETUP FOR KV-7010UA

S BOARD

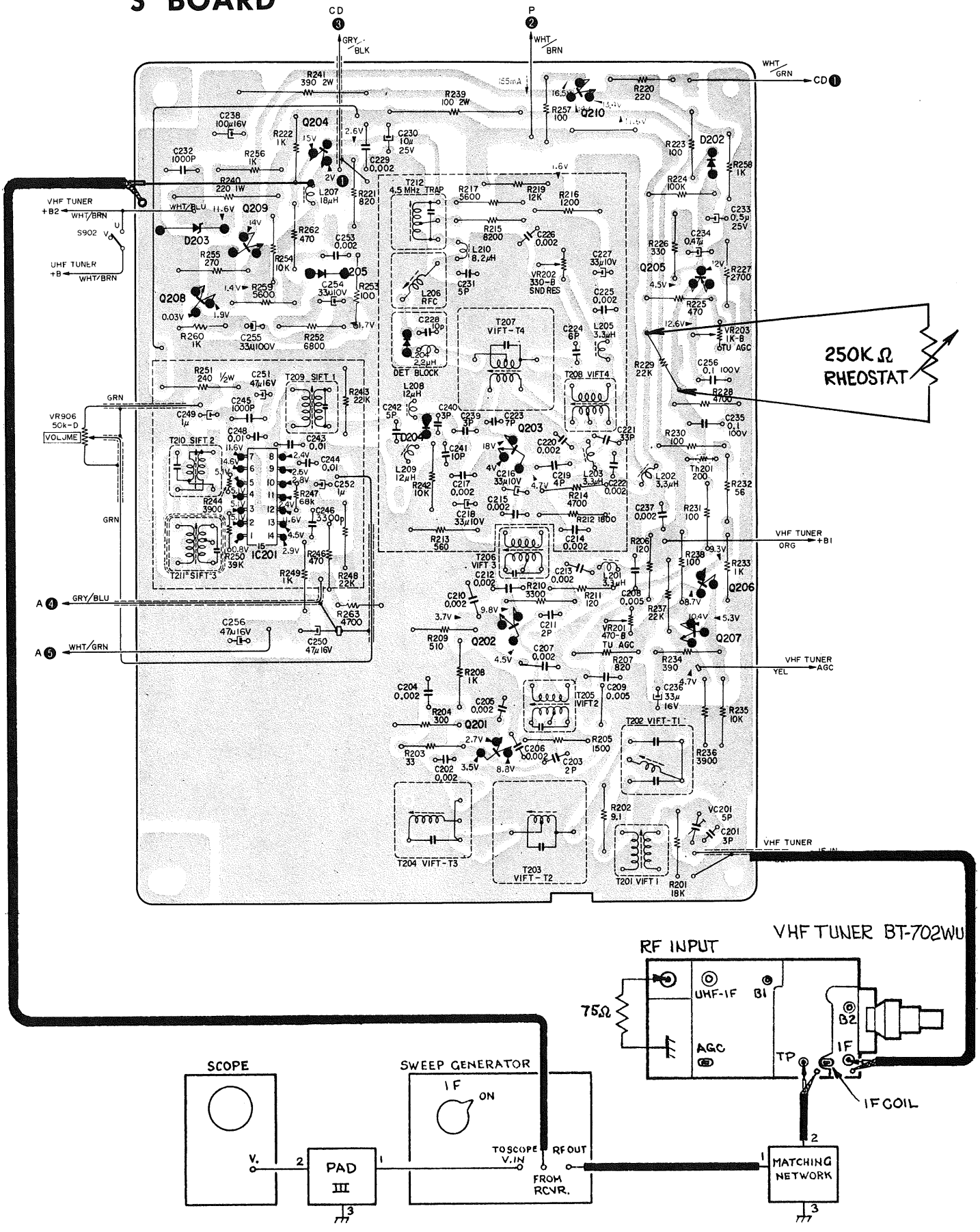


FIG. 1-6. KV-9000U VIDEO IF ALIGNMENT SETUP

S BOARD

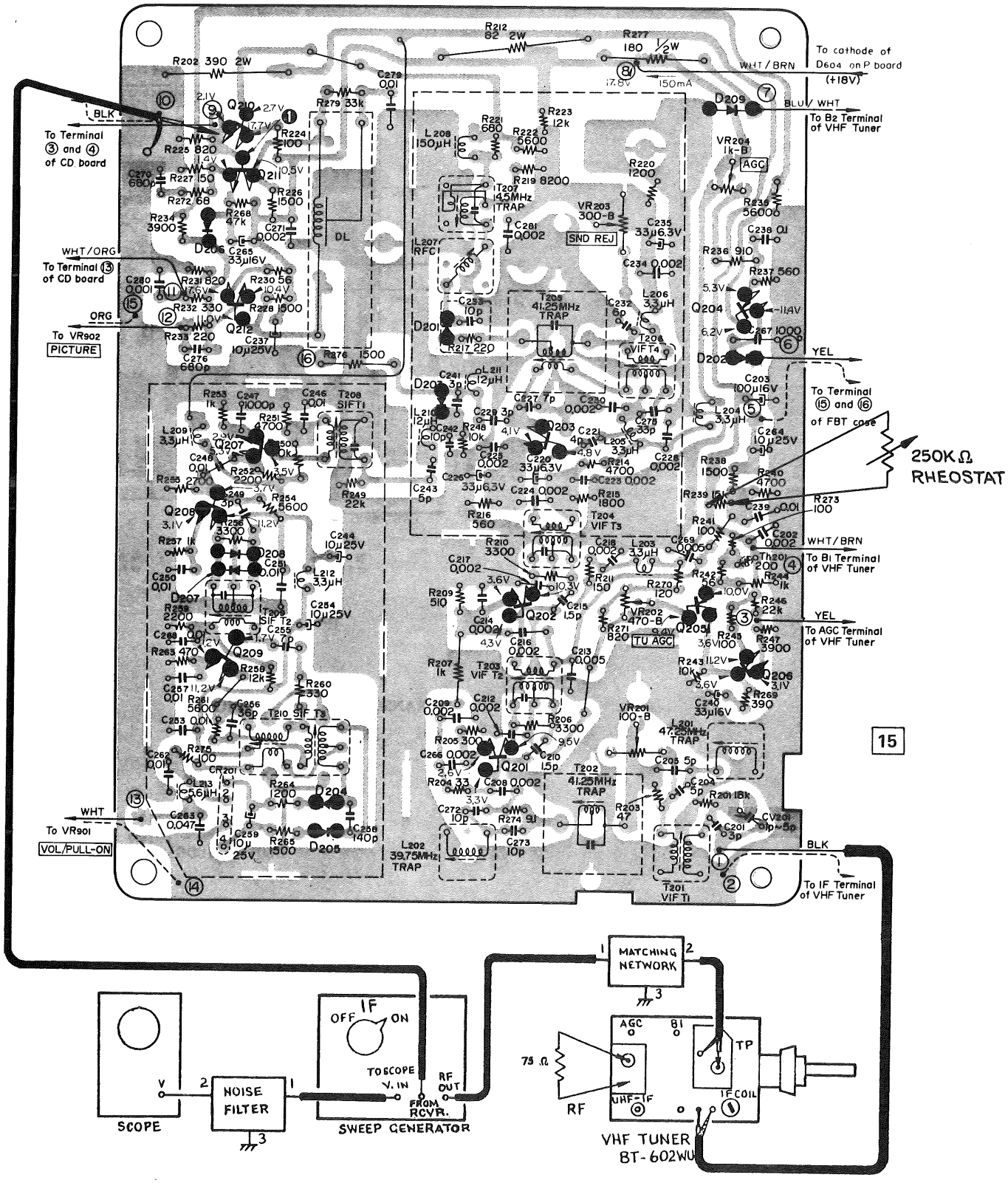


FIG. 1-7.

KV-1210U (Up to ser. no. 10 0,001)

VIDEO IF ALIGNMENT SETUP

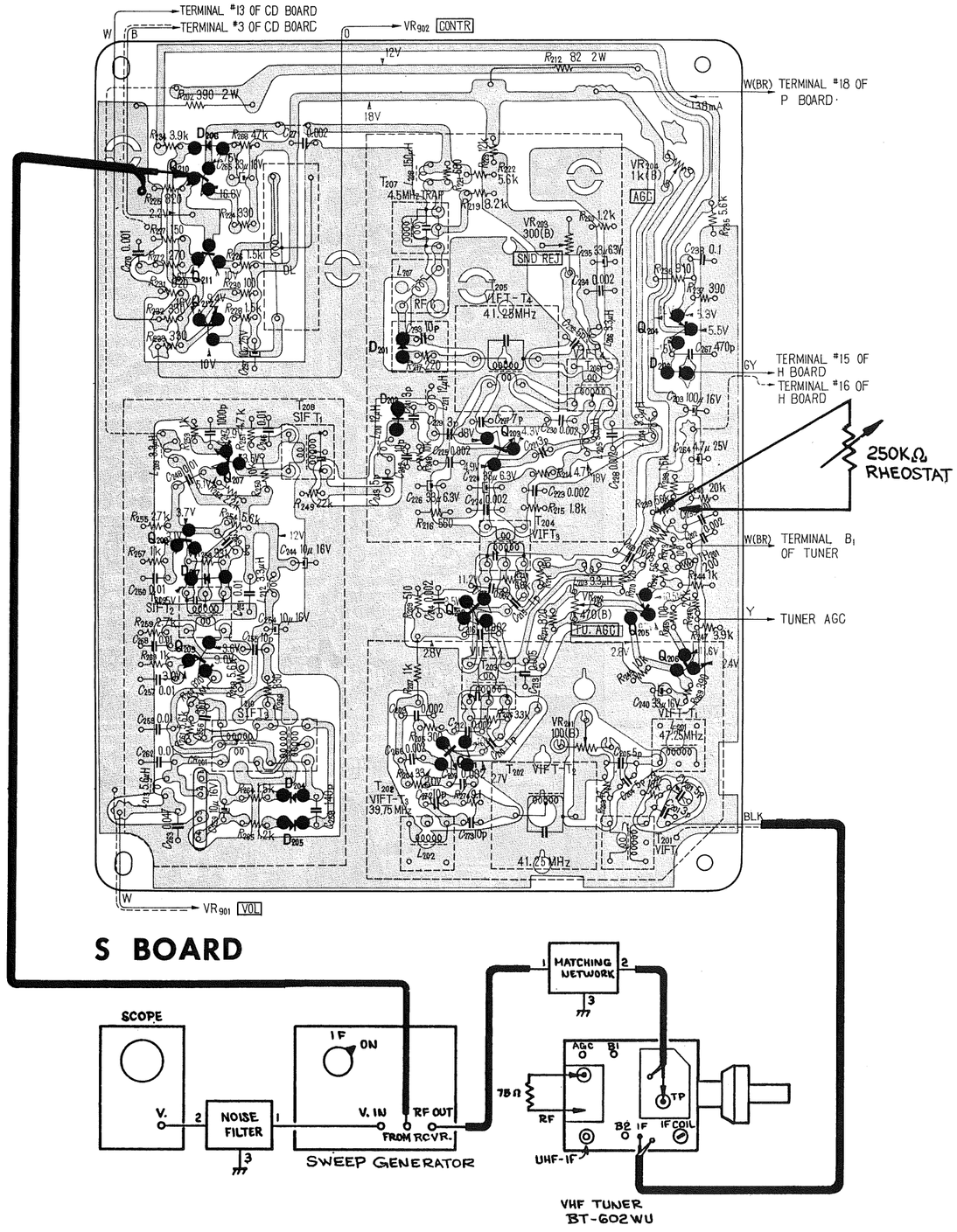


FIG. 1-8.

KV-1210U, -1200U, -1220U
VIDEO IF ALIGNMENT SETUP

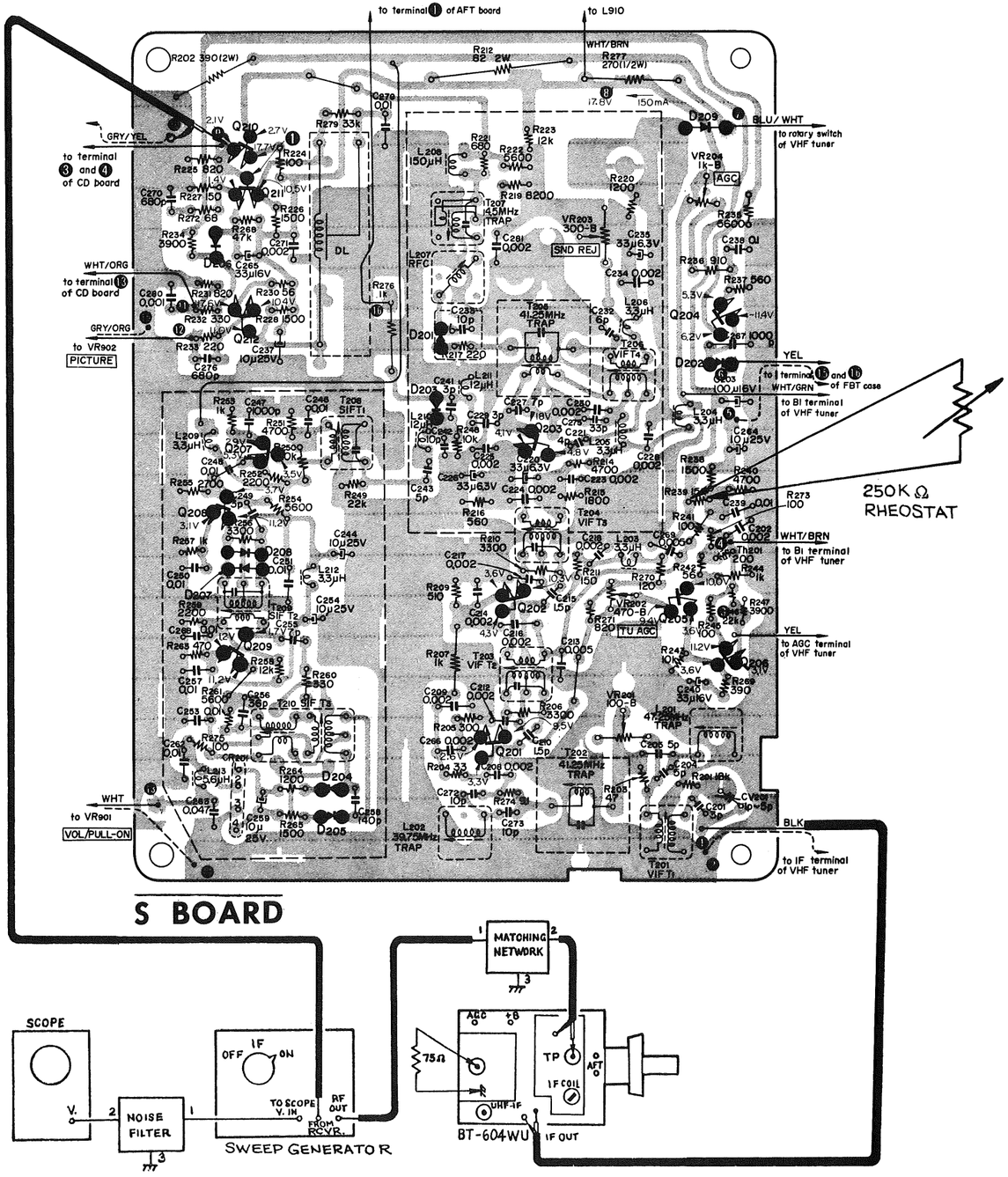
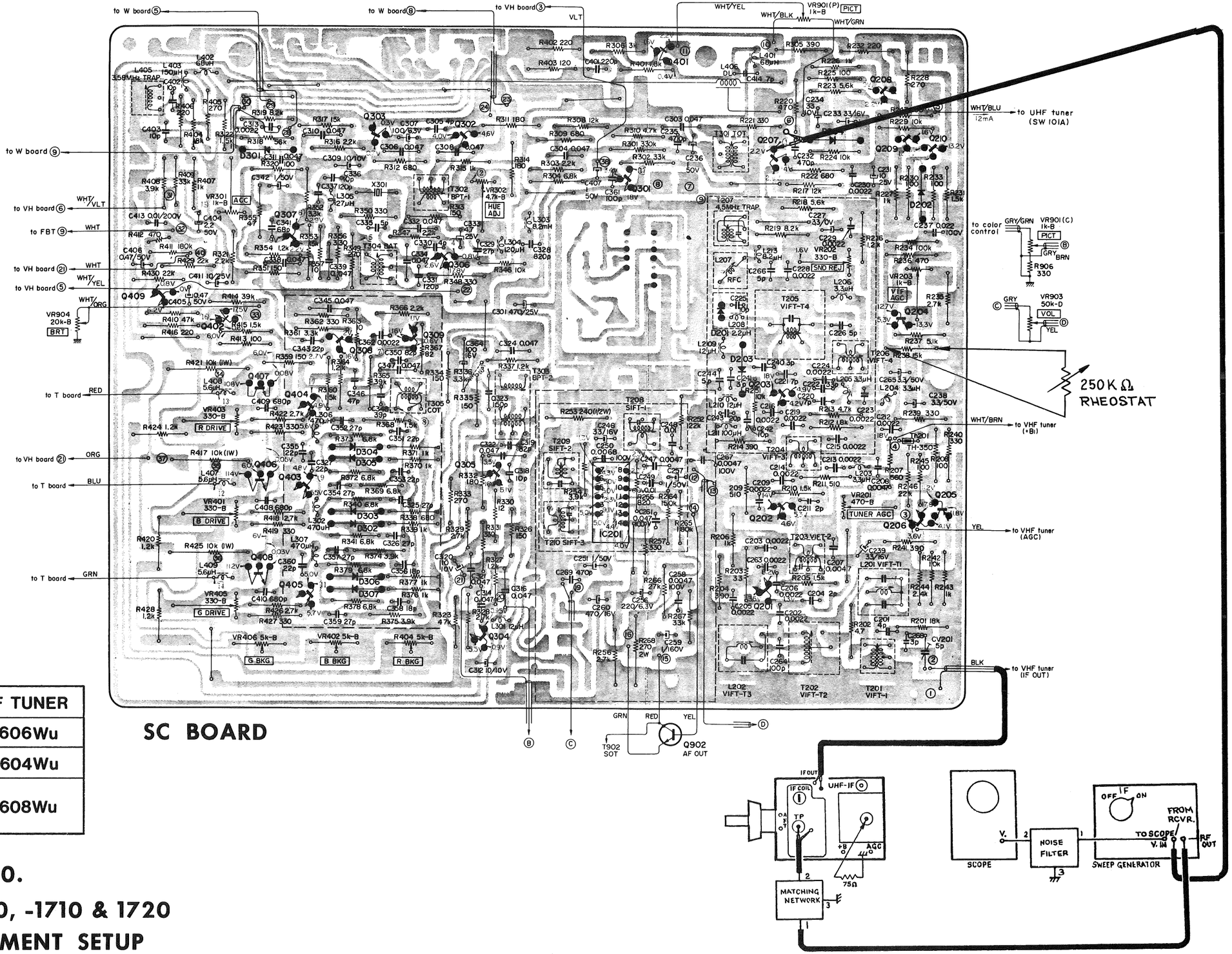


FIG. 1-9.

KV-1224
VIDEO IF ALIGNMENT SETUP



MODEL	VHF TUNER
KV-1201	BT-606Wu
KV-1212	BT-604Wu
KV-1710	BT-608Wu
KV-1720	

FIG. 1-10.

KV-1201, -1212, -1510, -1710 & 1720

VIDEO IF ALIGNMENT SETUP

2. AFT (AUTOMATIC FINE TUNING) ALIGNMENT PROCEDURE

1. EQUIPMENT REQUIRED:

   1. Video Sweep/Marker Generator Leader model LSW-330 or B & K model 415 If above are not available, use a Sweep Generator and a Marker Generator (crystal calibrated), each covering from 39 - 48 MHz

   2. Oscilloscope

   3. Vacuum tube voltmeter (used only in final check, after alignment)

   4. 250 kΩ rheostat

   5. Three pads:

Pad I	30 dB attenuator
Pad II	Matching network
Pad III	Noise filter

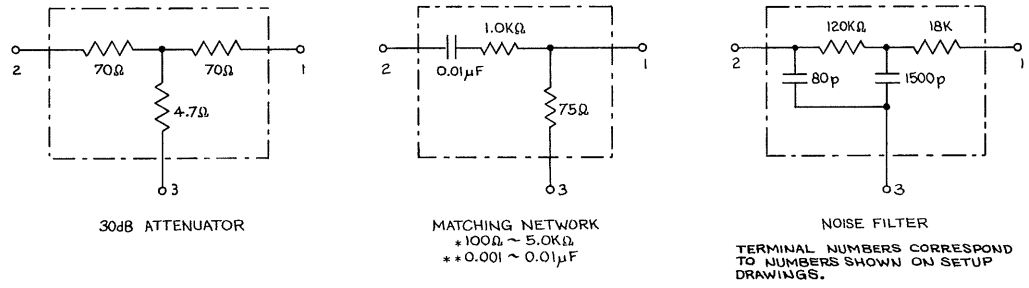


FIG. 2-1.

(When constructing these pads, make leads as short as possible.)

   6. 75Ω terminating plug

If sweep generator output is less than 100 mV RMS across 75 ohms, make Pad I 20 dB instead of 30 dB by changing components as shown below.

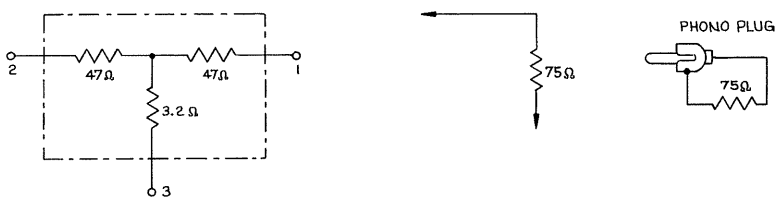


FIG. 2-2.

2. SET UP

1. Remove rf input connector (antenna) from VHF tuner and put a shorting plug in place of it.

2. Turn channel selector of tuner to the highest unused local station.

3. Set up as shown in Figure 1-3, and in the appropriate following (Figures 1-4 through 1-10) pictorial diagrams for various receivers showing S board, SC board or SD board connections.

4. Let the equipment warm up for at least 10 minutes.

5. Set the generator for 44 MHz, maximum output amplitude.

6. Set the oscilloscope horizontal sweep for 2 - 5 msec per division

7. Calibrate the scope to display 1.5 V over a large portion of the vertical scale.

8. Rotate the tuner AGC control VR-1 for minimum gain and the IF AGC control VR-2 for maximum gain, as indicated in the first two items of Table 1-1. Turn the alignment setup rheostat (250kΩ) for maximum gain, by observing the effect on the scope display.

9. Adjust the generator output amplitude so that the scope displays a video bandpass curve of 1.0V. DO NOT CHANGE THE GENERATOR OUTPUT AFTER THIS STEP.

10. Remove Pad I, the 30 dB (or Pad I, 20 dB) attenuator, and reconnect Pad II, matching network, directly to the tuner TP.

11. Adjust the 250kΩ rheostat to reduce the display on the scope back down to 1.0V.

12. Unsolder the two wires on the AFT terminals of the VHF tuner, which connects to AFT points #7 and #8 on the SC board as shown in Fig. 2-3.

13. Solder the tuner AFT terminals together with a short piece of wire.

14. Move the oscilloscope probe from the emitter of first video amplifier to AFT point 7 or point 8 on SC board. This may conveniently be connected by using the wire which was unsoldered from the AFT terminal at the tuner in step 12 above as shown in Fig. 2-3, and in the appropriate following (Figures 2-4 and 2-5) pictorial diagrams for various receivers showing S board, or SC board connection. Proceed with the alignment steps as follows.

2. AFT ALIGNMENT PROCEDURE

	Item	Adjust	Remarks
1.	Symmetrical width and max. amplitude of S curve (use max. sweep width)	AFT-T3	Balance top and bottom of waveform as nearly as possible
2.	Center point	AFT-T4	Adj. for 45.75 MHz cross-over point.
3.	Repeat steps 1 and 2		
4.	Reduce sweep width so display will be wider to permit better viewing of mid portion of curve (crossover point).		
5.	Move probe from wire at tuner which goes to AFT point 7 over to the other AFT wire (going to point 8) on SC board. Compare the waveshapes obtained at each point; they should be identical except inverted. Touch up AFT-T4 and AFT-T3 if necessary. Amplitude should be about 7 V (p-p). Readjust scope controls.		
6.	Final touchup of 45.75 MHz trap Remove 250kΩ rheostat and 75Ω tuner input resistor. Solder back two AFT wires to terminals on tuner. Remove rf generator input from receiver. Connect normal antenna to receiver. Perform AGC adjustment procedure in Section 7 & 8 of IF alignment procedure.	AFT-T4	
7.	Final check:	AFT-T4	
	a. Tune in a TV broadcast signal. Release AUTO/AFT button for manual operation. Detune Fine Tuning knob slightly clockwise to display 920 kHz beat interference in picture. (If necessary, adjust BRT, PIX, VER. & HOR. for best picture.)		
	b. Adjust to eliminate 920 kHz beat.		
	c. Press AUTO/AFT button. 920 kHz interference should dissappear. If so, release AUTO/AFT button, retune Fine Tuning knob to obtain the best picture.		
	d. Follow above procedure with some station which can be received in area.		

TABLE

	KV-1212/1201 KV-1710/1720	KV-1224
VR-1, Tuner AGC control	VR201 (CW)	VR202
VR-2, IF AGC control	VR203 (CW)	VR204
1st Video Amp Q1	Q207	Q210
R1, IF bias resistor	R238	R239
IC	IC-151	IC-151
AFT-T1	AFT-T3 L154	AFT-F1 T151
AFT-T2	AFT-T4 L155	AFT-F2 T152

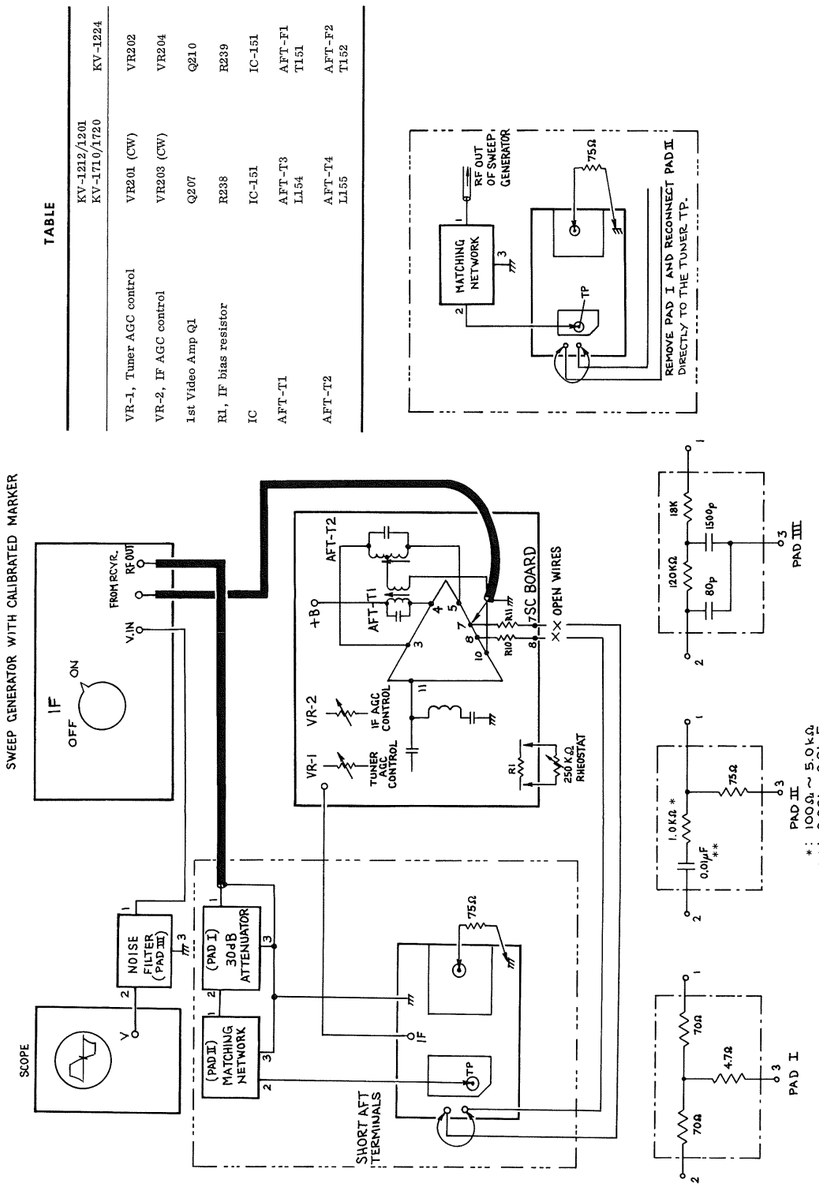


FIG. 2-3. AFT ALIGNMENT SETUP, GENERAL

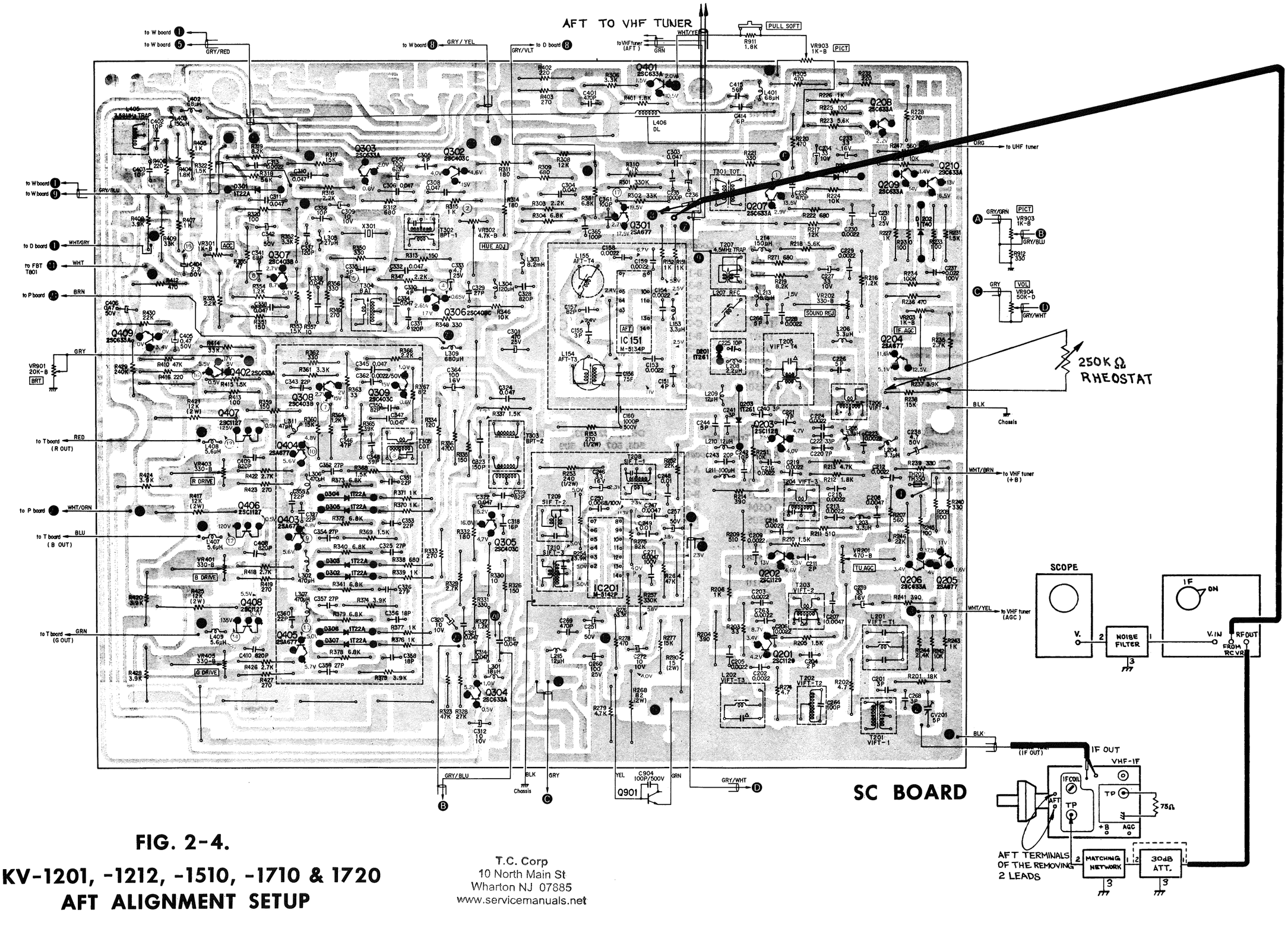


FIG. 2-4.

KV-1201, -1212, -1510, -1710 & 1720
AFT ALIGNMENT SETUP

T.C. Corp
10 North Main St
Wharton NJ 07885
www.servicemanuals.net

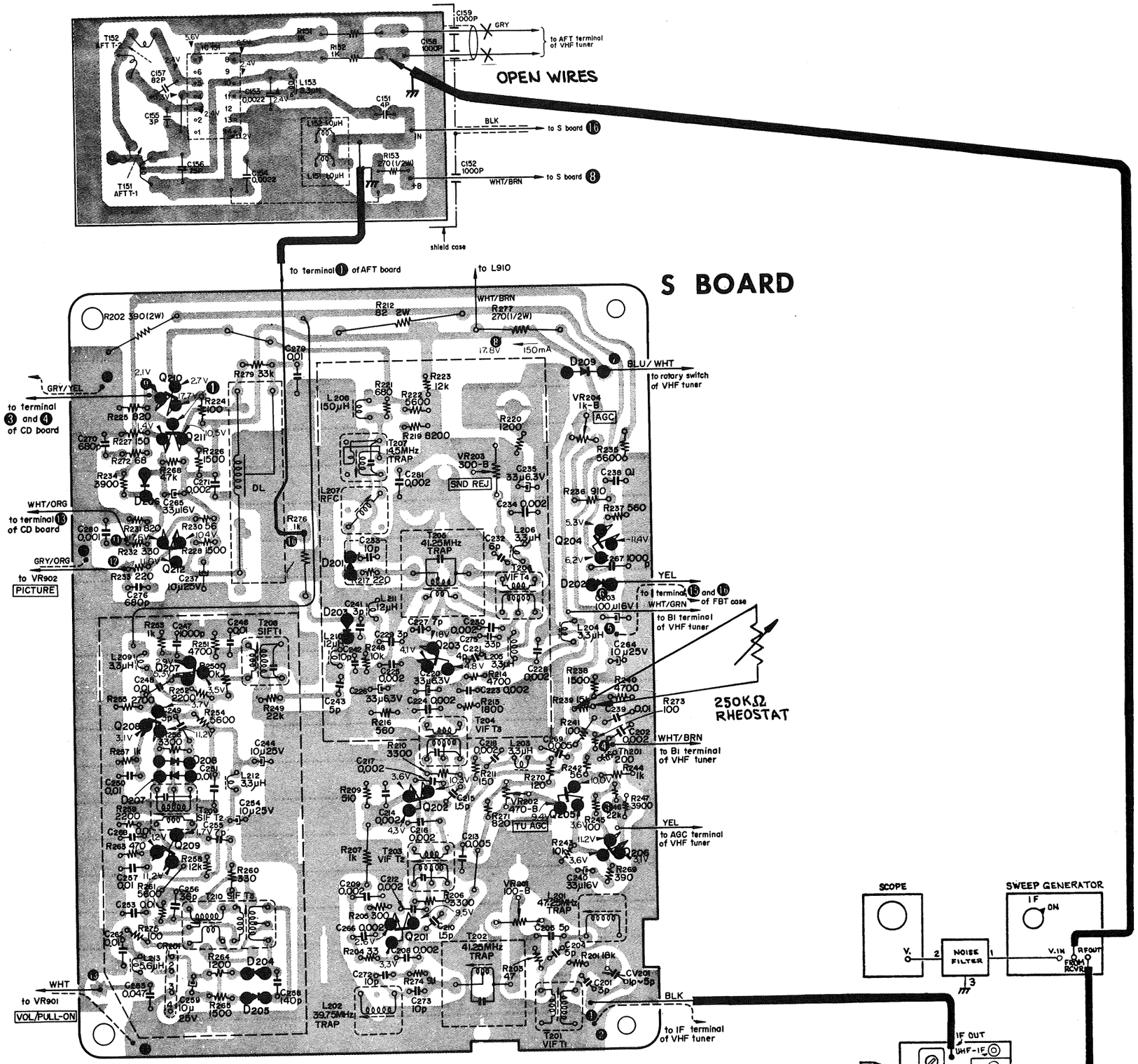


FIG. 2-5.

KV-1224
AFT ALIGNMENT SETUP

3. CHROMA BANDPASS ALIGNMENT PROCEDURE

1. EQUIPMENT REQUIRED:

   1. Video Sweep Marker, Leader model LSW-330 (preferred) - also acceptable is B & K Model 415
      If above not available, use a Sweep Generator and a Marker Generator (crystal calibrated), each covering from 39 to 48 MHz.

   2. Oscilloscope

   3. 250kΩ rheostat
      10kΩ potentiometer
      50kΩ resistor

   4. Three pads:

Pad I	30 dB attenuator
Pad II	Matching network
Pad III	Noise filter

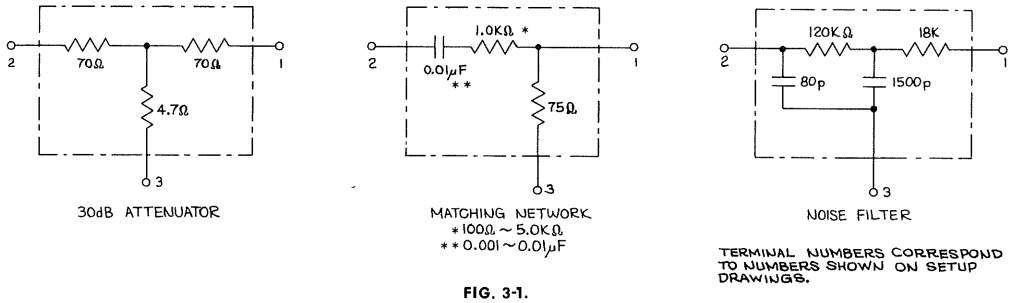


FIG. 3-1.

(When constructing these pads, keep lead lengths as short as possible)

   5. Oscilloscope probe or demodulator network shown in Figure 3-2.

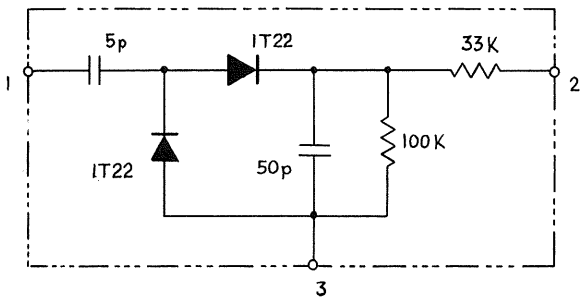


FIG. 3-2.

DEMODULATOR PROBE NETWORK

If a wide-band (10 MHz or better) scope is available, the probe or demodulator network may be omitted. In such a case the waveform in Figure 3-3b will be seen (idealized in the figure) and the amplitude should be about 5.5 V p-p, instead of 1.0 V p-p.

2. PRELIMINARY SETUP

1. Remove rf input connector (antenna) from VHF tuner and put a shorting plug in place of it.

2. Turn channel selector of tuner to the highest unused local station.

3. Set up as shown in Figure 1-3, and in the appropriate following (Figures 1-4 through 1-10) pictorial diagrams for various receivers showing S board, SC board or SD board connections.

4. Let the equipment warm up for at least 10 minutes.

5. Set the generator for 44 MHz, maximum output amplitude.

6. Set the oscilloscope horizontal sweep for 2 - 5 msec per division

7. Calibrate the scope to display 1.5 V (p-p) over a large portion of the vertical scale.

8. Rotate the tuner AGC control VR-1, for minimum gain, and the IF AGC control VR-2, for maximum gain, as indicated in the first two items of Table 3-1. Turn the alignment setup rheostat (250kΩ) for maximum gain by observing the effect on the scope display.

9. Adjust the generator output amplitude so that the scope displays a video band-pass curve of 1.0V. DO NOT CHANGE THE GENERATOR OUTPUT AFTER THIS STEP.

10. Remove Pad I, the 30 dB (or Pad I, 20 dB) attenuator, and connect reconnect Pad II matching network directly to the tuner TP.

11. VIF gain setting - Adjust the 250kΩ rheostat to reduce the display on the scope back down to 1.0V.

12. Short the base of the color-killer amplifier transistor Q5 to ground as shown in Fig. 3-4.

13. Set the COLOR control at mid-point (50% of rotation)

    Set the PICTURE control at 80% of clockwise (max.) rotation.

14. Perform one of the two following (a or b) steps, if the receiver being aligned is one of those listed:

    (a) For models KV-7010U, -7010UA, or -1210U(up to serial numbers 100,001),

short the center tap of the demodulator transformer DMT-R (or DMT-B or DMT-G, if more convenient) to ground with a 1μF/16V capacitor.

(b) For models with AFT function KV-1201, -1212, -1710, and -1720, short the AFT terminals (red and white wires) on the tuner with a short piece of wire or clip lead.

15. Change Equipment Setup as follows:

(a) Connect the 10kΩ potentiometer and 50kΩ resistor in series across the 18-volt bus as shown to bias the base of ACC amplifier transistor Q4.

(b) Connect the oscilloscope as shown in Figure 3-4 and the applicable one of the following Figures 3-5 through 3-10, according to the model receiver being aligned through the detector probe (or demodulator network, if no probe is available) across the secondary of BPT-2.

(c) Change generator output to 45.75 MHz, modulated with video sweep about 2.0 MHz, center frequency 3.58 MHz. Do not change amplitude of generator output.

(d) ACC bias setting
Adjust 10kΩ rheostat (=10kΩ potentiometer and 50kΩ resistor) to obtain a chroma bandpass curve of 1.0V (p-p (5.5V p-p without demodulator network) on the scope display. (Refer to Fig. 3-3a, b.)

Proceed with the alignment steps below

3. CHROMA ALIGNMENT

1. Adjust BPT-1 for minimum amplitude at 42.17 MHz (3.58 MHz) and best symmetry and adjust TOT for maximum amplitude at 42.67 MHz (4.08 MHz) and best symmetry of curve.

2. Adjust BPT-2 (both cores) for minimum tilt and best symmetry.

CAUTION: Keep cable length between probe (demodulator network) and BPT-1 and BPT-2 secondaries short, and do not bend or loop if possible. If this caution is not observed false readings of high frequency response may be obtained.

4. AGC POTENTIOMETER ADJUSTMENT

Perform IF AGC control (VR2) and Tuner AGC control (VR1) adjustments according to sections (4) and (5) of VIF alignment procedure (Refer to Page 1-4).

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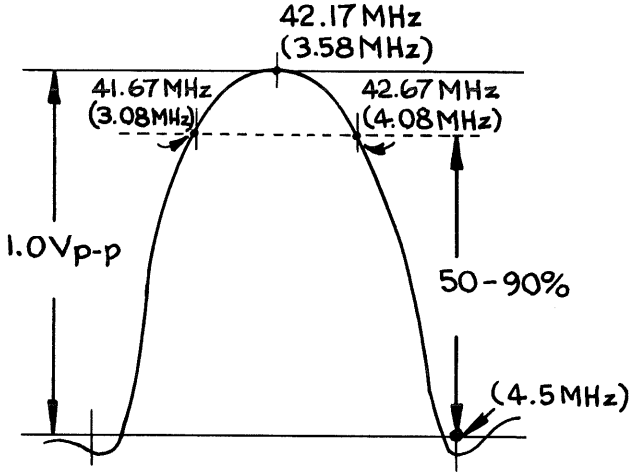


Fig. 3-3a.

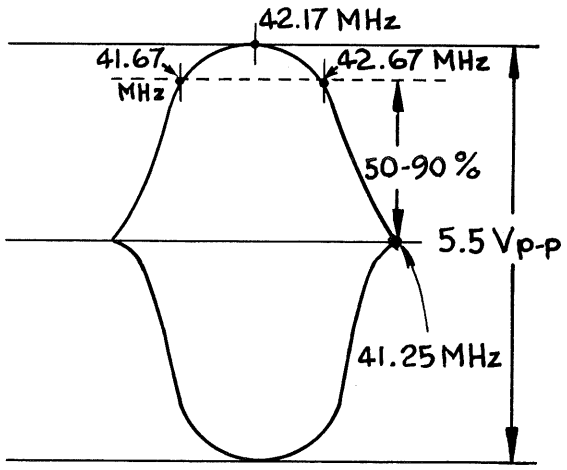


Fig. 3-3b.

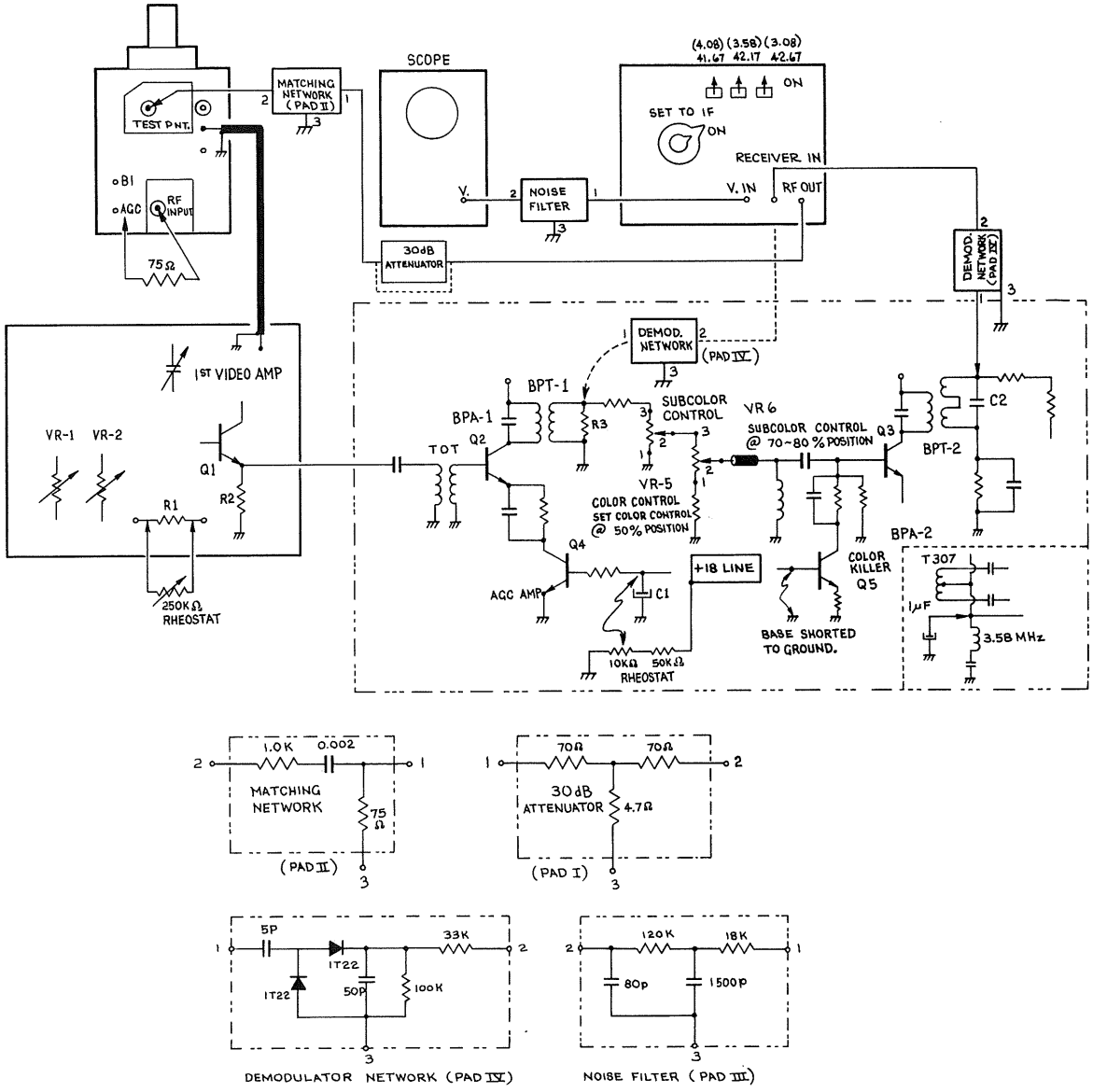


FIG. 3-4.
OVERALL CHROMA ALIGNMENT

TABLE 3-1

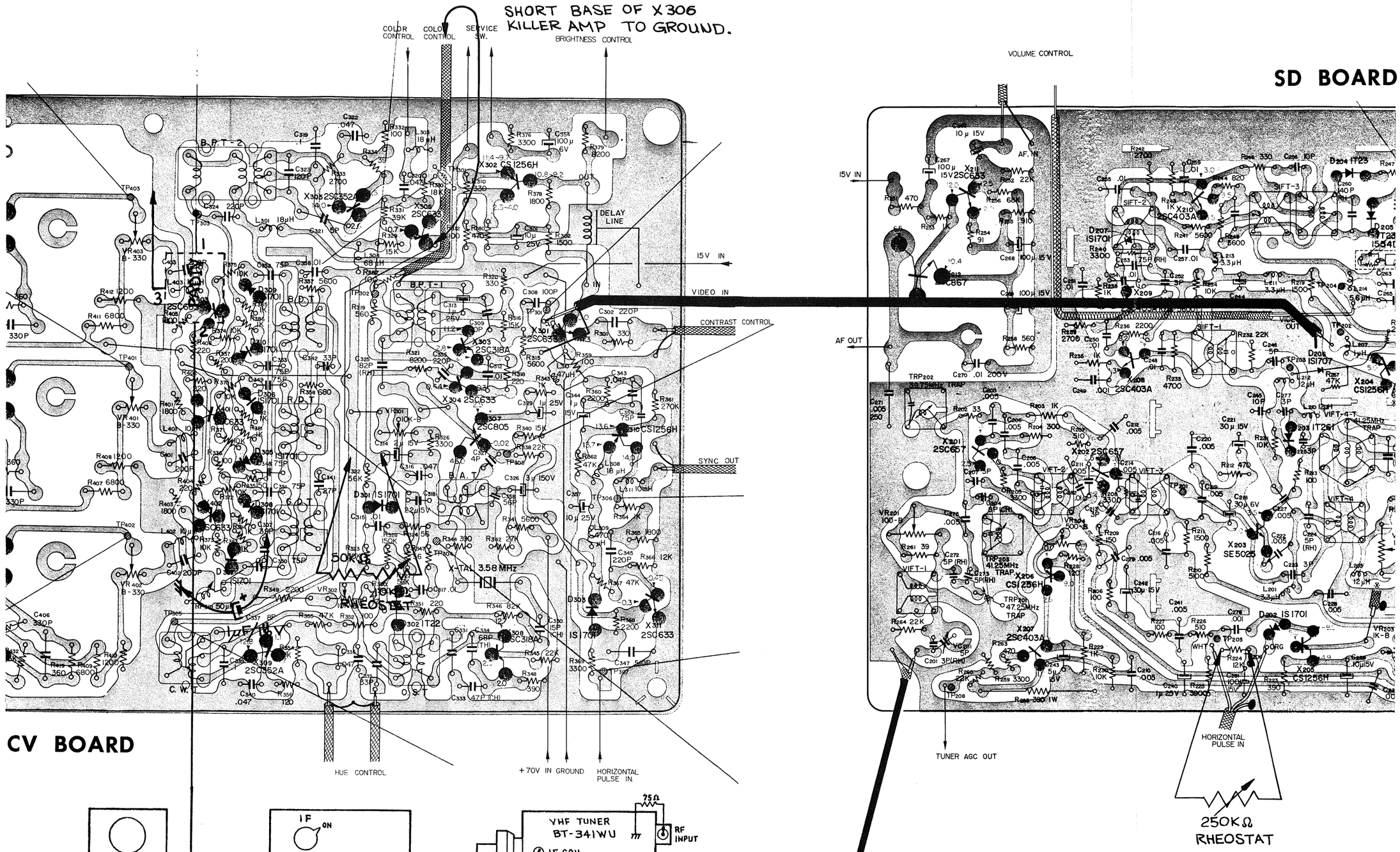
	KV-7010U	KV-7010UA	KV-9000U	KV-1210U*	KV-1200U, -1210U**, -1220
AGC control VR-1	VR202	VR202	VR201	VR202	VR202
AGC control VR-2	VR203	VR203	VR203	VR204	VR204
IF bias resistor	R224	R224	R229	R239	R239
1st Video Amp	X204	Q204	Q204	Q210	Q210
Bandpass Amp-1	X303	Q305	Q301	Q301	Q301
Bandpass Amp-2	X305	Q307	Q304	Q303	Q303
Automatic Color Control Amp	X304	Q306	Q302	Q302	Q302
Color Killer Amp	X306	Q308	Q303	Q304	Q304
	C314	C316	C310	C308	C309
	R319	R331	R307	R307	R307
	C324	C327	C324	C318	C324
Control, VR-5	VR903	VR902	VR902	VR904	VR904
Color control VR-6	VR905	VR905	VR901	VR908	VR908
Demod transformer DMT-R	RDT	DMT-R		DMT-R	-
Demod transformer DMT-G	GDT	DMT-G		DMT-G	-
Demod transformer DMT-B	BDT	DMT-B		DMT-B	-

* Up to Serial No. 100,001

** Serial No. 100,001 and later

SHORT BASE OF X306 KILLER AMP TO GROUND.

SD BOARD



CV BOARD

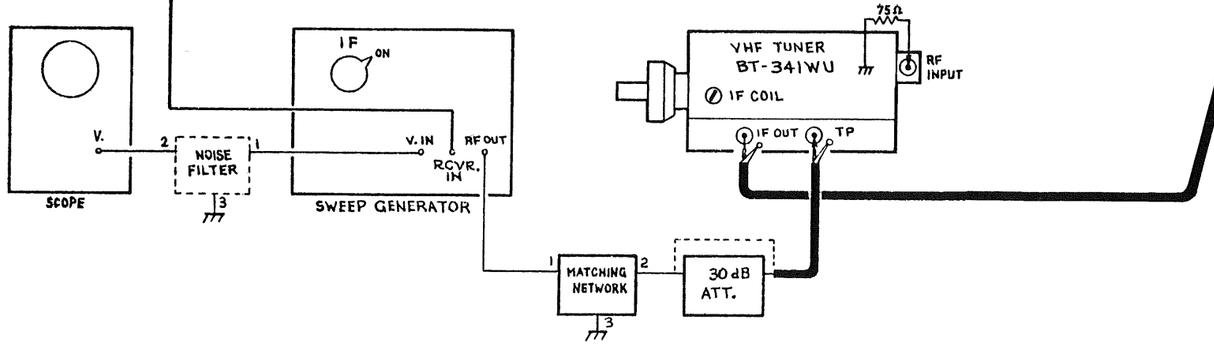
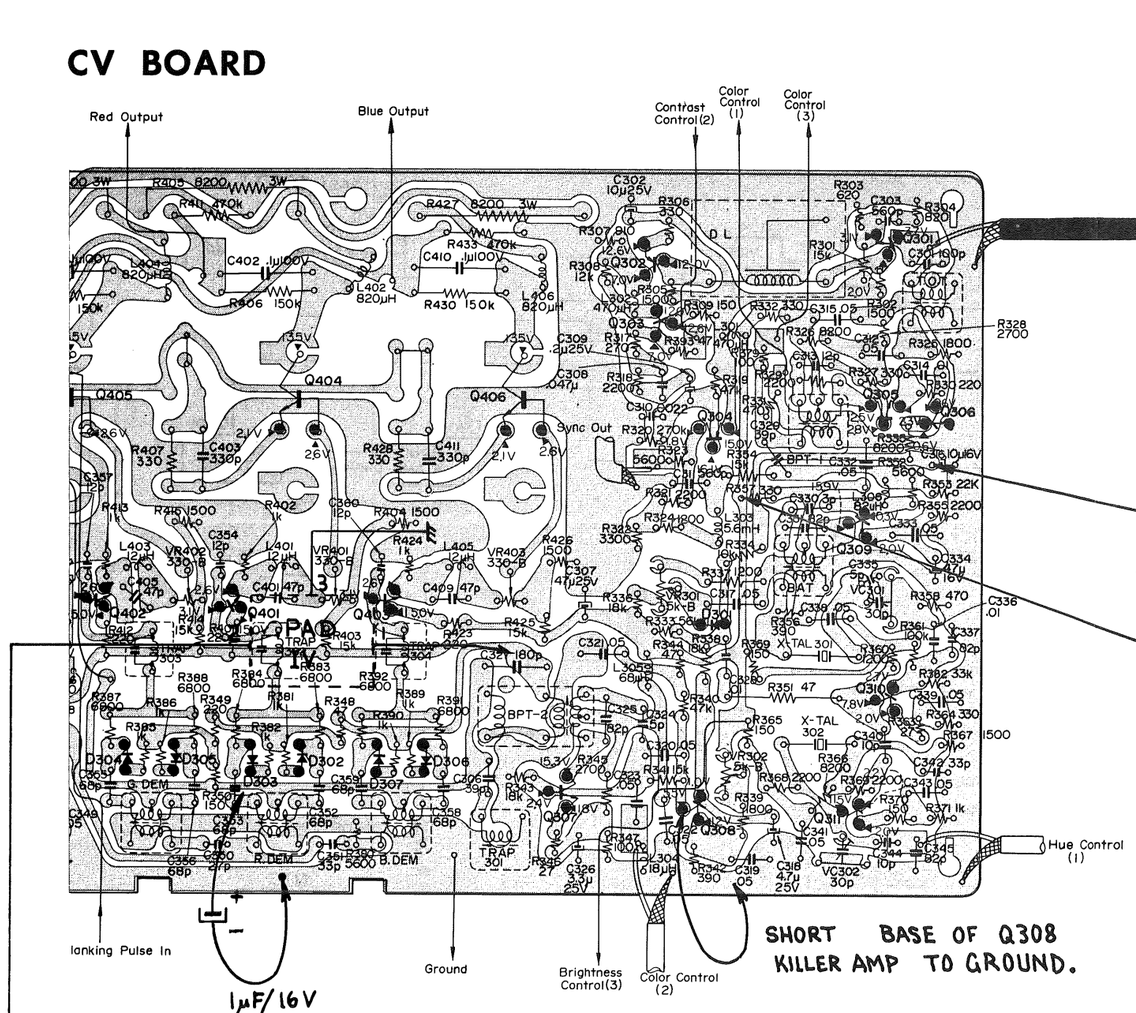
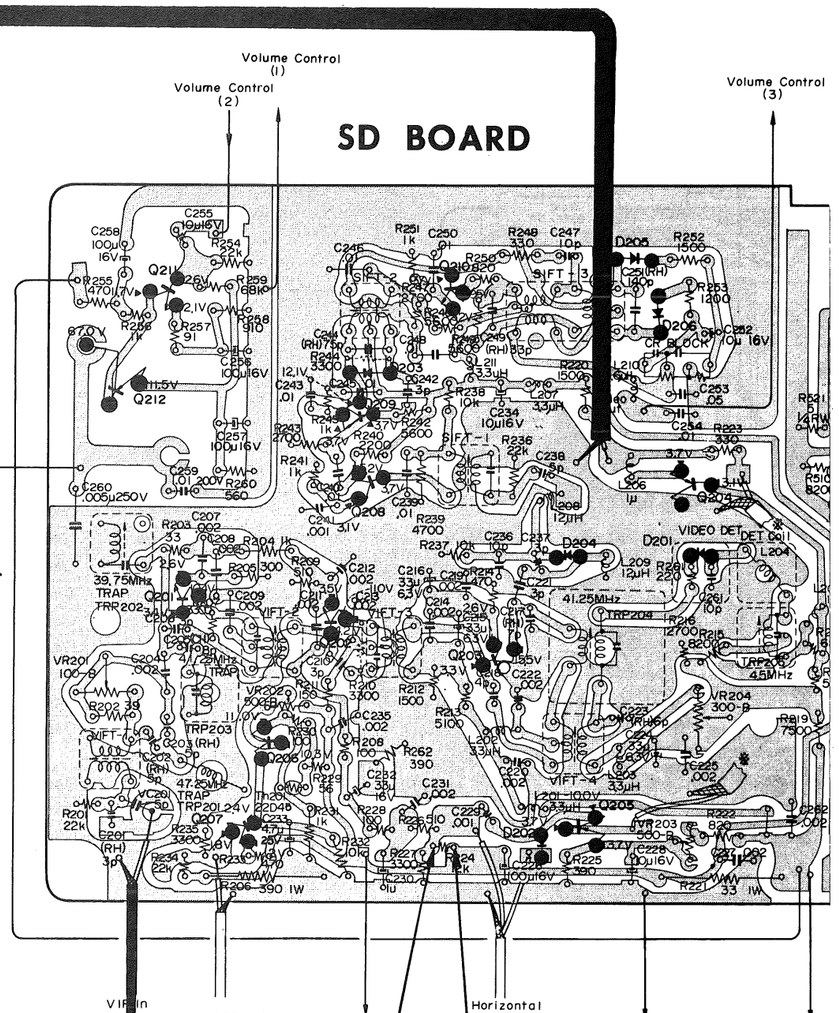


FIG. 3-5
KV-7010U.
CHROMA OVERALL ALIGNMENT

CV BOARD





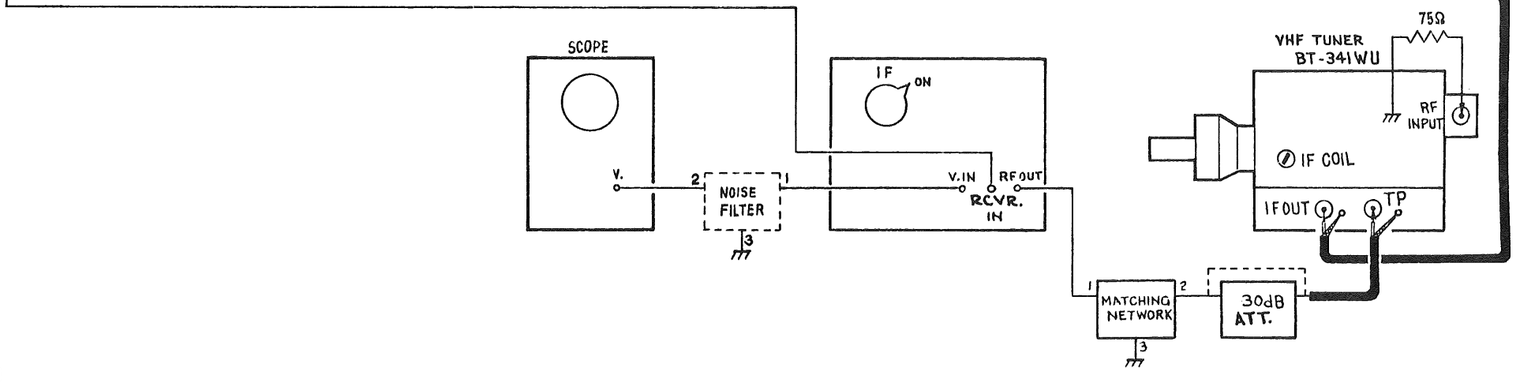
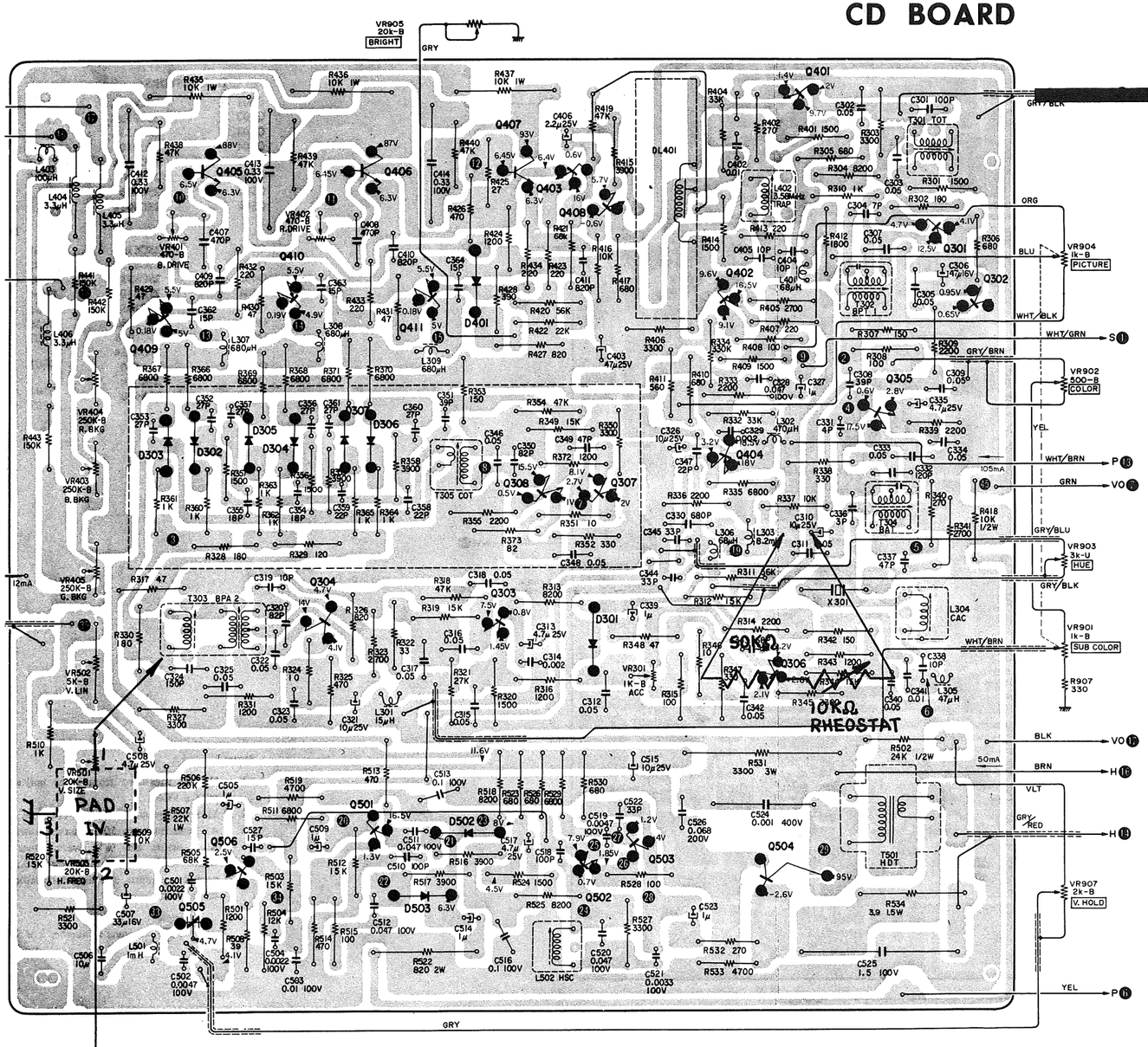


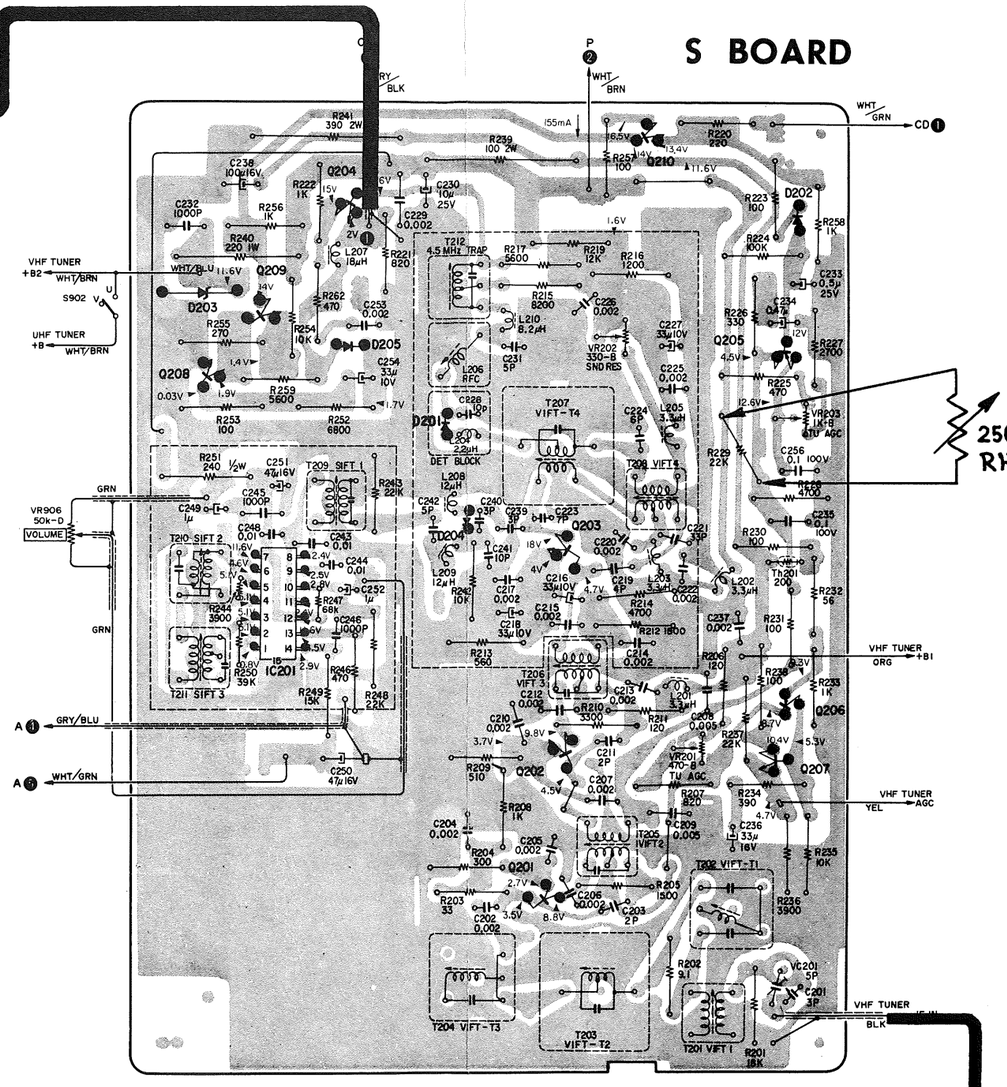
FIG. 3-6.

KV-7010UA
CHROMA OVERALL ALIGNMENT

CD BOARD



S BOARD



VHF TUNER BT-702WU

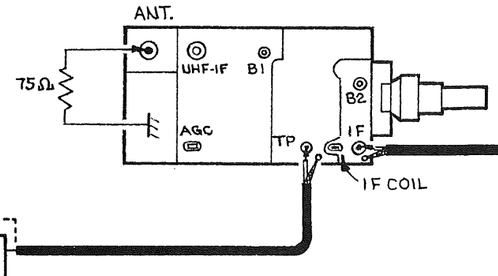


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FIG. 3-7.

KV-9000U

CHROMA OVERALL ALIGNMENT

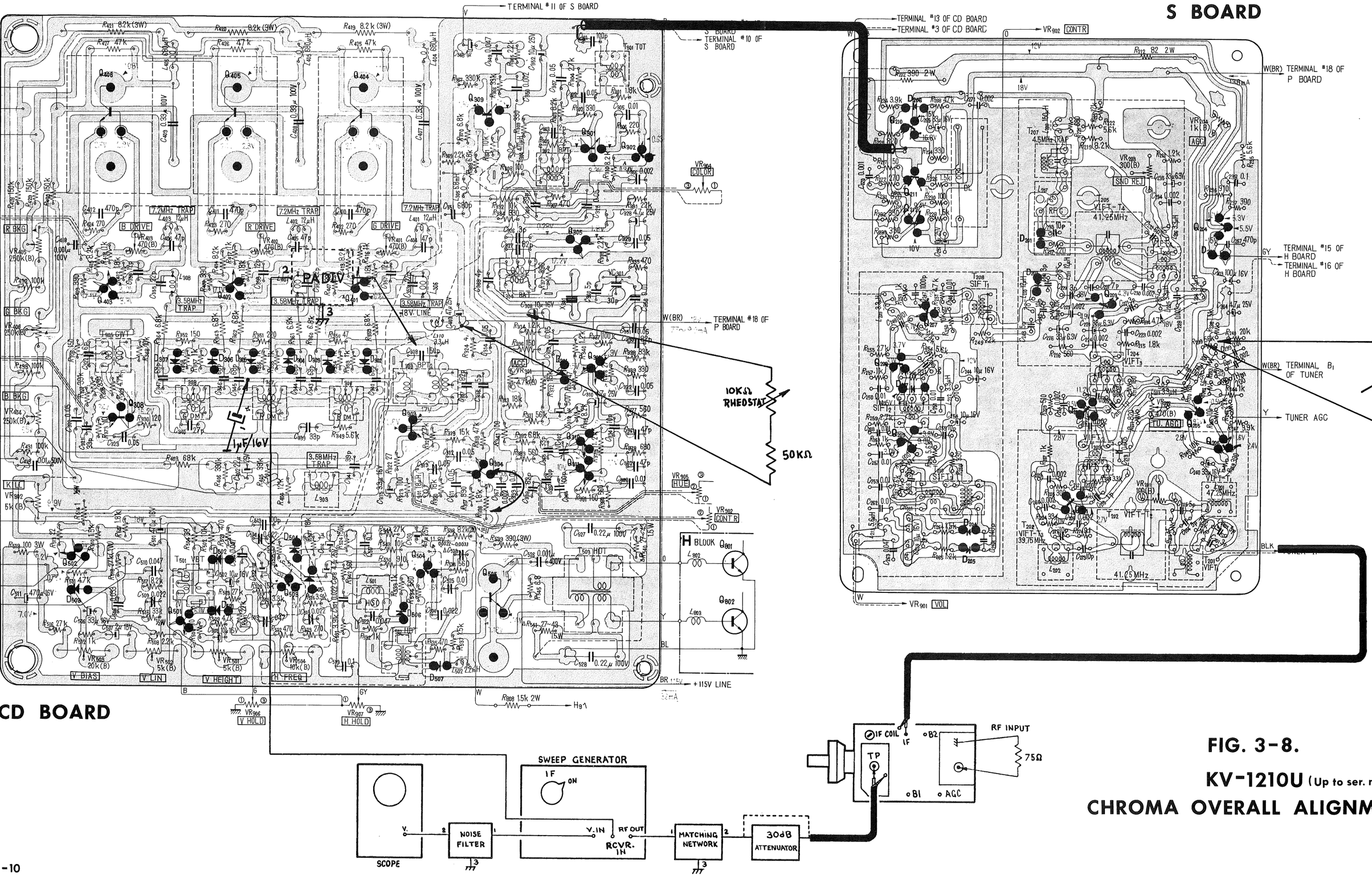

FIG. 3-8.

KV-1210U (Up to ser. no. 100,001)

CHROMA OVERALL ALIGNMENT

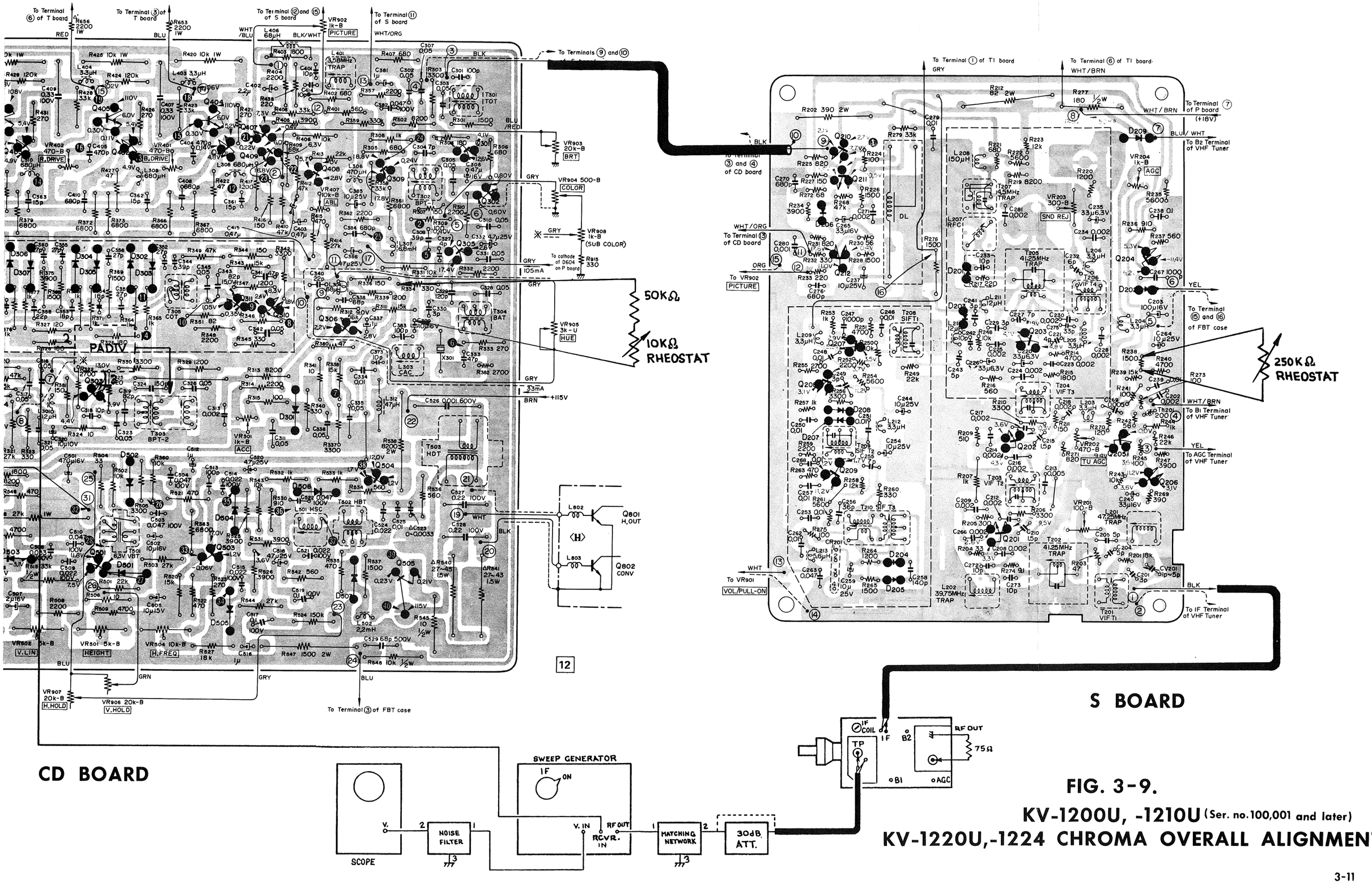

FIG. 3-9.

KV-1200U, -1210U (Ser. no.100,001 and later)
KV-1220U,-1224 CHROMA OVERALL ALIGNMENT

SC BOARD

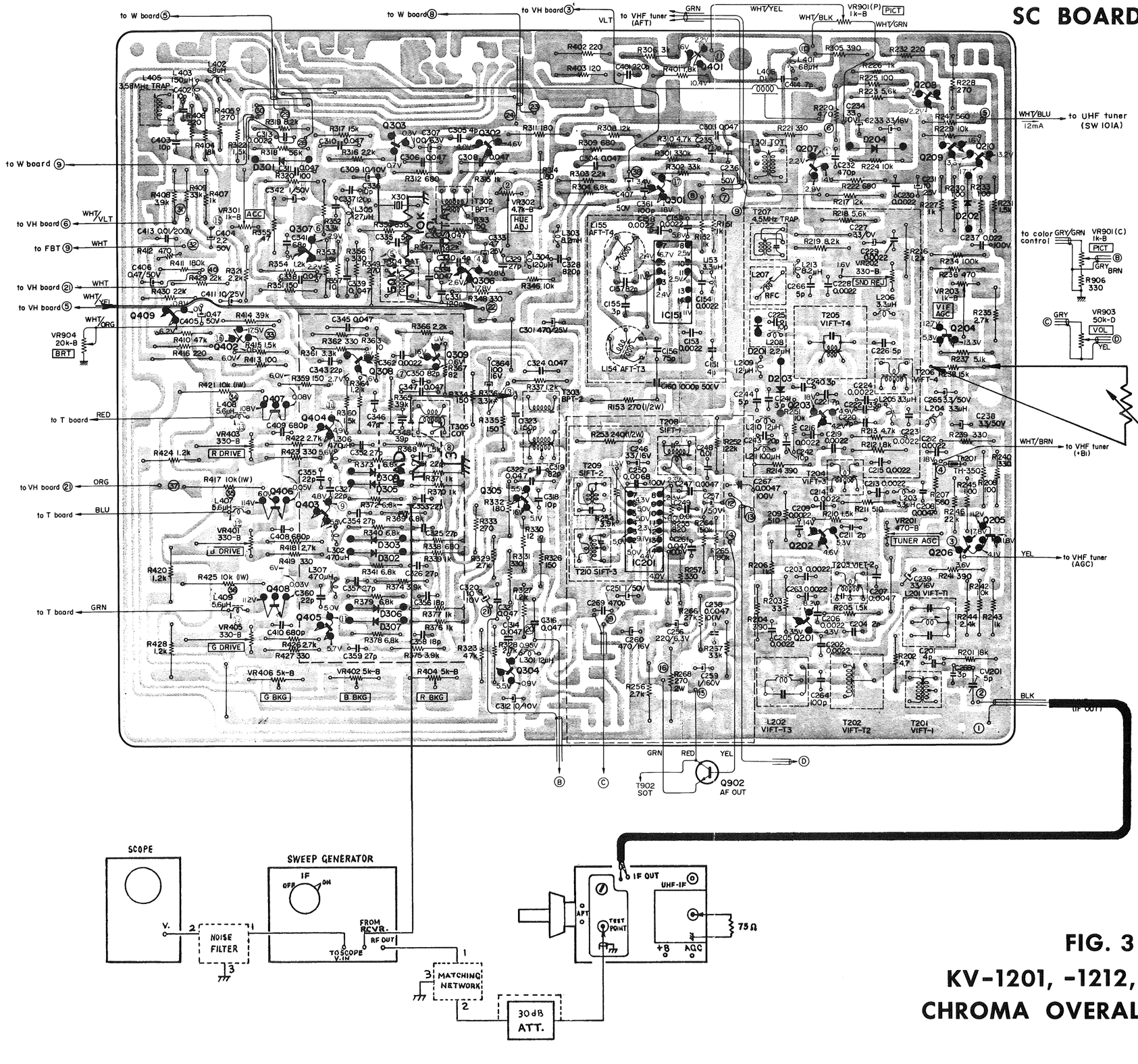

FIG. 3-10.

KV-1201, -1212, -1710&1720

CHROMA OVERALL ALIGNMENT